EPDLA

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EXECUTIVE SUMMARY

- **Polymer dispersions are an environmentally beneficial technology that helps to achieve the Commission goal for a less toxic environment.**
- **Polymer Dispersions greatly help reduce Waste and Costs for maintenance by increasing Durability and Useful Life of Products.**
- **Dispersions require specific methods for characterization, especially for the state of matter of the polymer [1], and an adequate lower limit to enable the analysis of mixtures.**
- **The beneficial contribution of dispersion technology to e.g. workplace hygiene, indoor air quality and the environment would be counteracted by an inappropriate negative perception of this technology if labeled as "Microplastics". Such general blacklisting needs to be avoided.**
- **Some markets will move back to environmentally less favorable alternatives using toxicologically dangerous, reactive or solvent based systems to avoid the burden and negative image of a microplastic label. The negative impact to human health and environment would outweigh the benefits of the restriction.**
- **For aforementioned reasons EPDLA believes that polymer dispersions should be excluded from the microplastics restriction because the restriction of polymer dispersions would not create a benefit for human health and environment but would rather lead to enhanced use of environmentally and toxicologically less beneficial technologies, i.e. regrettable substitutions.**

1. General Comments

EPDLA (European Polymer Dispersion and Latex Association, a Cefic Sector Group) is dedicated to promoting the safe manufacture, transportation, distribution, handling and use of waterborne polymer dispersions, in compliance with regulatory requirements and industry guidelines.

EPDLA members are committed to Responsible Care® principles and have implemented risk management according to the precautionary principles.

[1] EPDLA Statement on the determination of the state of matter Microplastics-RAC Meeting 53, of May 2020.

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Polymer dispersions are used as raw materials (binders) in many waterborne applications, for example in adhesives, varnishes and coatings, printing inks, nonwovens, paper and paperboard and textile finishing agents. Polymer dispersion technology has been used safely and successfully for more than 50 years and has contributed significantly to a reduction in the release of organic solvents into the environment. The use of polymer dispersions has helped to reduce the use of organic solvents in workplaces leading to improved worker health and similarly has contributed to cleaner air in the home. Common to all dispersions and covered by this statement, is a film forming process during application.

EPDLA acknowledges the concern caused by plastic waste being not adequately collected and thus being released to the environment, posing a potential risk to environment and possibly human health.

Part of the overall picture is Microplastic particles ("Microplastics") which in the meantime have been analytically detected nearly everywhere. The majority of such microplastics are formed from plastic articles which degrade in the environment into small pieces. Only a small part of microplastics found in the environment are caused by intentionally added microplastics which are used to provide targeted properties for products used in all levels of the value chain. The EPDLA is committed to the protection of the environment and human health and supports efforts to minimize emissions of microplastics. However, it is highly unlikely that dispersion polymers enter the environment in microplastic form and thus, no data on the findings of dispersion polymers as microplastic in the environment are available. All data in the microplastic restriction are based on theoretical calculations on emissions into household waste water and would assume the unrealistic direct emission of household waste water into the environment. Therefore, covering dispersions with the microplastic restriction would create no benefit for human health nor the environment and could lead to substitution by environmentally and toxicologically less beneficial technologies.

2. Polymer dispersions are an environmentally beneficial technology that helps to achieve the Commission goal for a less toxic environment

2.1. Dispersions are an established technology to comply with VOC goals

Dispersions technology has been used safely and successfully for more than 50 years and has contributed significantly to a reduction in the release of organic solvents into the environment. Various studies on VOC reductions were performed in preparation of the Paints Directive 2004/42/EC. See the references listed https://ec.europa.eu/environment/air/pollutants/stationary/paints/paints_legis.htm.

Emissions of non-methane volatile organic compounds (NMVOC) have been reduced by more than 50 % in the EU between 1990 and 2017 (EEA Report No. 08/2019; UBA Text 46/2020). A significant part of this are reduced emissions from industrial coating processes. Coating processes were directly addressed with the guideline 1999/13/EC followed by the industrial emission directive 2010/75/EC, both setting limits for the use/emission of solvents. These limits will be refreshed by the new surface treatment with solvents BREF (STS BREF)[2] which is expected to be published soon in the Official Journal of the European Union in 2020. The new STS BREF will on average require about 40% further VOC-reductions by 2024 for major applications.

In the course of this development, waterborne coating systems based on polymer dispersions have become indispensable as a well-established technical solution. They provide the necessary high-performance level consumers and industry are used to and rely on in order to protect goods worth billions of Euros. The use of polymer dispersions has helped to reduce the use of chemical additives in customer end-products due to e.g. improvement of rheology, reduce the use of organic solvents also in professional workplaces e.g. applying water-based paints/coatings or adhesives, leading to improved worker health and similarly has contributed to cleaner air in homes. It has been proven by eco-efficiency studies that dispersion-based technologies create an environmental advantage compared to solvent based solutions e.g. for food packaging adhesives and printing inks[3]. Accordingly, after assessment in the Economics and Cross-Media effects BREF (ECM BREF) it is e.g. stated in annex 14 of this BREF: "From the results presented here, the preferred option would be the water-based printing process. It has the lesser environmental impact for 4 of the 8 categories, and also consumes less energy and produces less waste."

Furthermore, the technical document on EU European Ecolabel and Development of EU Green Public Procurement Criteria for Indoor and Outdoor Paints and Varnishes indicates the advantages of such water-based technologies over alternatives[4]. One example for the beneficial use of dispersions is the use of waterborne adhesives for the bonding of soft foams, which are used for all kinds of soft furniture. According to market figures from IVK (Industrieverband Klebstoffe) the market growth during the last 10 years in this application happened completely in waterborne systems. Based on calculation, this saved the processing of about 4 000 tons of organic solvent in 2019 in the EU. Dispersions can also help to avoid /reduce VOC in packaging applications. One example can be found in the heat-seal segment (dispersions to close packaging). Over 95% of the heat sealable lacquers for dairy lidding, aluminium cheese packaging and pharmaceutical medicine blisters are still solvent based. Total volume of these areas is roughly 40 000 tpa. The solvent-based heat sealable lacquers contain 80% solvent while the dispersions normally contain 60% water.

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[2] The Best Available Technique reference document (BREF) for the surface treatment using organic solvents, STS BREF, is the vehicle through which best available techniques and emerging techniques are determined in a transparent manner, based on sound techno-economic information. The key elements of a BREF are the reference for setting permit conditions to installations covered by the Industrial Emission Directive. The BREFs inform the relevant decision makers about what may be technically and economically available to industry in order to improve their environmental performance and consequently improve the whole environment. (source: https://www.esig.org/regulatory/stsbref/)

[3] Eco-efficiency analysis of laminating adhesives for flexible packaging, Maik Schindler, Nicola Paczkowski (Packaging Films, 24863 · Volume 7 · July · 3-2016)

[4] https://ec.europa.eu/environment/ecolabel/documents/Paints%20Background%20Report.pdf

2.2. Polymer dispersions do not pose a risk to human health or the environment

The only source for emissions of dispersion droplets into the environment identified by ECHA was paints and coatings. This was based on data from CEPE, The European Council of the Paint, Printing Ink and Artists' Colours Industry, on a calculation from losses into the wastewater drain by washing of brushes and rollers. It should be noted that a typical decorative paint in its delivery form consists of up to 50% of pigments and fillers and only about 10 – 30 % of polymer. Paint made from waterborne dispersions is not different in that perspective to paint made from a solvent based alternative. In addition, even when considering these losses, it could be shown that normal wastewater treatments completely retain finely dispersed polymers by adsorption to sediment[5]: The polymer content in the discharged water of the Synthomer waste water treatment plant of the compound site in Oss (Netherlands) was below the detection limit. The method applied to clean the wastewater was coagulation/flocculation-filtration. The organic part of the solids content was <0,1% - the polymer content will be even (far) lower.

Since most of the other applications of polymer dispersions are industrial, any foreseeable emission into environment is highly unlikely. During their industrial use as raw materials for e.g. adhesives or fiber bonding, paper coating or printing inks, the fate of the dispersion droplet is to form a film and cease its discrete existence as a droplet. Therefore, polymer droplets from dispersions cannot be found in the environment and cannot pose a risk to human health or the environment.

In the case of nonwoven materials for e.g. disposable protective suits or for medical applications as secondary packaging of medical equipment which allows sterilization, Polymer Dispersions even help to protect human health. They provide e.g. high temperature resistance and water vapour permeability to facilitate sterilization of e.g. surgical and dental equipment. Estimates from EDANA (the voice of nonwovens) members[6], point to a global market size of more than 80 000 tons for such medical packaging, whereas around 100 000 tonnes of binders are used for all bonded nonwovens[7].

2.3. Polymer Dispersions help to achieve the Commission goal for a less toxic environment

Due to their unique property to create a durable film by coalescence of non-toxic high molecular weight polymers, polymer dispersions are a water-based alternative to reactive systems (for e.g. adhesives / construction chemicals) and the associated hazard profiles. Their nature enables avoiding harmful solvents to create safe and durable food packaging. VOC emission into the environment is greatly reduced by use of dispersion products compared to solvent based alternatives. These environmental advantages may be overlooked should dispersions receive a negative image due to a disproportionate classification as microplastics.

[5] Data from Synthomer on wastewater treatment on their site in Oss

[6] Private communications from two different EDANA members

[7] Data from EDANA (the voice of nonwovens)

A classical process to produce high performance artificial leather was a precipitation process using suitable polymers diluted in N, N-Dimethyl-formamide (DMF), a hazardous solvent which is classified as reprotoxic cat. 1B. The diluted polymers were precipitated on textile carriers by adding water. Lots of water had then to be used to remove traces of DMF from the finished leather to comply with regulations, meaning that lots of water had been contaminated with DMF and has been released as wastewater into sewer systems. Modern waterborne polymer dispersions helped to completely replace DMF in the precipitation process. By doing this, workers are not exposed to DMF vapor at their workplaces any more. The process requires less than 50 % of the water to clean the leather after production due to the sheer absence of DMF. Last but not least consumers are also not exposed to traces of DMF in the final products (e.g. clothing, furniture) any more. Products made using the dispersion process will be stigmatized as being made with "Microplastics", whereas imported products produced using the DMF-process would be "free of Microplastics".

In the Li-ion cell manufacturing process, PVDF (Polyvinylidene Fluoride) resins are used in the cathode and anode slurry making processes. For various reasons, e.g. processing requirements and environmental issues, binder manufacturers are gradually moving away from using PVDF and instead are making use of aqueous polymer dispersions as binders.

Aqueous polymer dispersions use water to replace the organic solvent used in battery production. Solvents often used for this purpose include N-Methylpyrrolidone (NMP) or N-Ethylpyrrolidone (NEP). Switching to aqueous polymer dispersions helps to reduce the use of such hazardous solvents in the manufacturing process of Li-ion batteries.

Fluoro-carbons in oil and grease barriers (fast food packaging) can be replaced by using acrylate dispersions as barrier coatings.

2.4. Polymer Dispersions help reduce waste and costs for maintenance by increasing durability of products

Road construction in the modern world is a highly sophisticated technology. Dispersions are added to bitumen to enhance durability and reduce cracks by improving elasticity and will make a road surface last much longer. Dispersions allow direct modification of bitumen for asphalt on-site. On-site modification of neat bitumen increases production flexibility which is gaining importance due to the increase in processing of recycled asphalt. In addition, the thickness of the asphalt layer can be decreased significantly while performance remains constant. This means a significant saving of material while adding only small amounts (less than 1%) of dispersion. When dispersions are considered microplastics these applications will suffer due to the negative image.

As already mentioned above in the area of paints and coating, waterborne systems based on polymer dispersions protect goods worth billions of Euros e.g. in building and construction.

Polymer dispersions help to improve durability of material items which may have UV exposure e.g.: sun blinds to help prevent breakdown and yellowing. They help to improve water resistance of materials e.g.: sun blinds again and tents and in water-proofing applications in construction for durability of surfaces in wet environments e.g.: bathrooms and swimming pools. Also those examples show the benefit of a “1 component” water-based alternative compared to “2 component” reactive systems.

Polymer dispersions improve the durability of the steel structures in buildings as part of intumescent coatings and help to maintain the structure of the building in case of fire for longer and enable safe exit of people inside – thus saving lives.

In food contact material applications, dispersions are used as barrier coatings for protection against mineral oil and other contaminants. Polyethylene coextruded (paper)board is the incumbent technology for water (paper cups), vapor (dry and frozen food) and oil & grease (petfood boxes) barrier packaging. Polyethylene coextruded (paper)board and wax impregnated board are difficult to recycle. These barrier coatings can be replaced by acrylate dispersion coatings. Paper with barrier coating from dispersions is recyclable / repulpable whereas polyethylene will complicate recycling processes. These environmental advantages may be taken overlooked should dispersions attract a negative image due to a disproportionate classification as microplastics.

3. Dispersions require specific methods for characterization other than bulk polymers

3.1. Characterization of the state of matter

Determining the state of matter for the polymers in polymer dispersions is complex and not feasible with the analytical methods proposed by RAC. The EPDLA proposed to use the Minimum Film Formation Temperature (MFFT) instead but this was not considered further by ECHA or RAC. For more details, please refer to the EPDLA position on the determination of the state of matter[8]. However, EPDLA’s position seems to be confirmed by the following sentences from the ECHA Background document[9]*: It cannot be excluded that there might be polymers in a solid state in the size range of 1-100 nm. Based on the properties of NLP (‘no longer polymer’) substances, polymer particles with dimensions below 100 nm may be (viscous) liquids, which would exclude them from being microplastics. However, identifying the physical state of a particle with nanoscale dimensions is analytically challenging, if not impossible as standard methods have been developed for establishing bulk chemical properties.*

Many dispersions contain polymers that are liquid in the dispersed stage. Polymer droplets are dispersed and stabilized in water and regarded as bound in the liquid matrix[10]. They cannot be isolated as discrete droplets or particles by simple separation techniques and do not exist without their waterborne

[8] EPDLA Statement on the determination of the state of matter_Microplastics-RAC Meeting 53, of May 2020.
[9] https://echa.europa.eu/documents/10162/2ddaab18-76d6-49a2-ec46-8350dabf5dc6
[10] EPDLA position paper on polymer dispersions and nanotechnology_Final May 2015

environment. Their fate is to form a film e.g. as an adhesive or paint. As the water in the mixture evaporates, a separation between the aqueous and the polymeric phase begins and leads to the film formation via coalescence of the polymer droplets[11].

Picture of a typical polymer dispersion

Human or environmental exposure to individual polymer droplets or particles is thus highly unlikely under advised conditions of use.

3.2. Characterization of mixtures – Importance of an enforceable lower size limit

The limitations of currently available analysis methods shall also be considered when setting the lower limit for particle size in the restriction proposal. To prove the presence or absence of microplastics in mixtures it is necessary (according to the definition), to identify the polymer and its state of matter. It could be demonstrated[12] that with state-of-the-art analytical methods the lower limit for such measurements in complex mixtures such as paints or printing inks is at about 1 µm particle size. It should be remembered, that cost for analysis increases the smaller the particles are and the more sophisticated analytical techniques are needed. This will disadvantage particularly SMEs. Even a lower size limit or no limit at all will create an inherent disadvantage for producers in the EU towards importers. Producers in the EU will not be able to prove the potential absence of microplastics in their products. For imported mixtures, authorities will not be able to check whether there are microplastics in the products or not. This would create an uneven playing field.

[11] Please refer to EPDLA Website to watch the video on 'Film Formation of Polymer Dispersions'

[12] „Microplastic identification in complex formulations", V. Boyko, U. Blumenstein, C. Bunte, P. Falcigno, W. Wohlleben (BASF), Informationsgespräch zum ECHA-Beschränkungsvorschlag „intentionally added microplastics", VCI NRW, Düsseldorf, 23.3.2020

4. Specific comments on the SEAC opinion

EPDLA welcomes that most applications of polymer dispersions are not subject to a ban in the proposed restriction of intentionally added microplastics. Nevertheless, polymer dispersion technology as a whole is subject to labelling and reporting requirements due to an inadequate definition of the state of matter and insufficient analytical methods to detect microplastics in mixtures. Such blacklisting could pose a threat to this technology, being beneficial for the environment and human health as pointed out above.

As long as dispersions are used in industrial plants, the labeling and reporting obligations create additional costs without any positive effect on the environment. Industrial plants in the EU have to fulfill tight obligations on risk management measures and are controlled on a national/regional level for their release of wastewater and solid waste.

The beneficial contribution of dispersion technology to workplace hygiene, indoor air quality and the environment is counteracted by the inappropriate negative perception of this technology as being "Microplastics".

4.1. Cover the labeling obligation and generic information on polymers in the Safety Data Sheet

Producers of polymer dispersions, i.e. the members of EPDLA, do not have any direct sales of dispersions to professional users or consumers. All dispersions are supplied to industrial plants (e.g. coatings producers, paper producers, textile coaters, fiber glass bonding etc., which are typically subject to permits for their releases. In these plants, dispersions are used as part of formulations together with pigments, additives etc. and in many uses are converted directly into articles (e.g. artificial leather, paper).

The Safety Data Sheet (SDS) is a well-established tool for the communication of chemical hazards between industrial users (business to business, B2B). Any additional information required between industrial users should be included in the SDS. A parallel labelling on individual packages should stay voluntary. Additional information requirements on such a large number of products create costs for the industry to implement and to keep the information up to date. Implementation costs have been estimated for the 17 EPDLA members alone to be in the range of 2.5 – 3.8 MM € based on the information currently available. Additional labels on containers and drums do not provide any advantage in communication, but can easily increase costs by factor 4 – 5 without any beneficial effect on the environment.

Additional information requirements on the polymer identity should not exceed the existing requirements which are already covered in the SDS. As microplastics are thought to be identified as being hazardous due to their sheer existence and their particulate nature, any information on the chemical composition beyond that already required for the SDS cannot solve any issue. In general, a reporting requirement including polymer composition creates problems with the protection of intellectual property especially when thinking about formulations in the area of coatings, adhesives and printing inks, where the mixing of different polymers is key to create the intended technical properties.

Any labelling obligation may counteract the EU goals of a circular economy: When recycling materials which originally contained polymer dispersions, it will be very difficult to decide if the materials for recycling will have to be labelled or not: Due to their unique properties, polymer dispersions in mixtures with inorganic fillers/pigments in e.g. paints, coatings or construction products may lead to particles with a continuous polymeric film of nano-size thickness. Since such particles would be classified as microplastics under the current restriction proposal, they would then need to be considered for the reporting and labelling requirements.

77% of all Construction waste (German figures) is currently being recycled, i.e. 46 million tons alone in Germany in 2016[13]. Would this percentage of waste being recycled decrease if construction waste would have to be considered microplastic due to containing Nano-thin polymer coated inorganic material?

Additionally, carpet-backings contain polymer dispersions in mixtures with inorganic fillers/pigments. Carpets are recycled and shredded for use e.g. in equestrian surfaces and roofing materials[14] – will this be possible in the future? Will recyclers still use such materials, when the raw material they intend to use (the former carpet-waste) has to be classified, and labelled as microplastic?

10s of millions of tonnes of paper are produced within the EU each year and in 2016 an estimated 72.5% of paper waste was recycled[15]. With the use of polymer dispersions in the paper production process will the recycled paper pulp be classified as a microplastic? The EPDLA is concerned that classification of paper pulp as a microplastic would negatively impact the perception of recycling paper as a beneficial activity leading to lower rates of recycling across the world. This is surely a step backwards in terms of the circular economy targets as detailed in the European Green Deal.

4.2. Reporting obligations

Dispersions are produced in industrial chemical plants which are already subject to high requirements concerning any emissions and are regulated and controlled on a national level. Chemical plants are connected to wastewater treatment plants which coagulate potential emissions of polymers into the sludge with high efficiency. Typically, the sludge is incinerated to avoid any release of chemicals to the environment. It must be noted that dispersion droplets will cease to exist when mixed with

[13] Deutsche Bauchemie: Informationsgespräch zum ECHA-Beschränkungsvorschlag *„intentionally added microplastics“ (VCI NRW, 20.03.2020, Düsseldorf)*

[14] https://carpetrecyclinguk.com/what-carpet-can-be-recycled-into/

[15] Kline report Synthetic Latex Polymers: Global Business Analysis and Opportunities

inorganics in sludge due to film formation. The numbers from the Synthomer plant in Oss quoted above show that no dispersion droplets are found in wastewater – they must be fixed in the sludge. If they ever were they can no longer be seen as microplastic due to the film formation.

Dispersions are exclusively supplied to industrial plants which have to comply with the same legislation on a national level like the ones mentioned above. Here the dispersions are used to formulate products e.g. paints, adhesives, etc. and in many cases, such as textile coatings, paper and glass fiber sizing, are converted into articles where the polymer droplets lose their particulate character and form a film.

Paints, coatings and printing inks are just two out of many applications for polymer dispersions and are the only ones with direct sales to professionals and consumers, but have been identified as the main source for releases of dispersions into the drain. This is the sole reason to obligate all users of dispersions to report annually, independent from the application. This creates additional costs in all industries dealing with dispersions without any proven contribution to the environmental problem – and the consumer has to pay for it. While only about 5 200 tons of dispersions are emitted to the environment according to the ECHA report based on numbers from CEPE; more than 2 million dry tons of polymer dispersions (ca 4 Million tons wet, i.e. in the delivery form) are produced annually in Europe[16]. The EPDLA thinks such reporting looks like clan-liability and is disproportionate, taking into account these figures. All applications using polymer dispersions might get stigmatized despite the proven track record of environmental and health benefits, and analytical proof that no dispersion droplet makes it into the environment under foreseeable conditions of use.

Conclusion

The EPDLA supports Cefic's position on the publication of the REACH restriction proposal on microplastics: We call for a regulatory measure that is proportionate, scientifically sound and which brings tangible benefit to the environment.

Efforts necessary to comply with the current draft restriction proposal would be disproportionate for polymer dispersions both from a technical and socioeconomic point of view. This is due to ECHA's restriction proposal containing a definition of microplastics which is too broad while leaving much room for interpretation, and which will make its implementation and enforcement challenging, if not impossible. Imports from outside of the EU could not be sufficiently controlled, creating an uneven playing field.

[16] Kline report Synthetic Latex Polymers: Global Business Analysis and Opportunities https://klinegroup.com/reports/y612series/

We therefore call for a more balanced, clearer and enforceable definition of microplastics which considers the specific properties of dispersions. The EPDLA believes that polymer dispersions should be excluded from the microplastics restriction because no detriment to human health or the environment is identified, and the restriction would lead to enhanced use of environmentally and toxicologically less beneficial technologies. The environmentally beneficial dispersion technology will be burdened with a negative perception without any justification and identification of risk. A general classification of polymer dispersions as microplastics creates a disproportionate burden for all industries dealing with dispersions; the socioeconomic consequences of the proposed restriction would be severe, although yet difficult to quantify.

A restriction with a balanced, pragmatic and workable outcome is needed.

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About EPDLA
EPDLA (European Polymer Dispersion and Latex Association), a Cefic Sector Group founded in 1991, is dedicated to promote the safe manufacture, transportation, distribution, handling and use of waterborne polymer dispersions, in compliance with regulatory requirements and industry guidelines. EPDLA members are committed to Responsible Care® principles and have implemented risk management according to the precautionary principles.

Disclaimer

- The present input has been developed by EPDLA members in good faith, to the best of its knowledge and following the latest scientific evidence.